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(54) Title: METHODS OF REGULATING SKIN CONDITION WITH CENTELLA ASIATICA EXTRACT

(57) Abstract

The present invention relates to the topical use of Centella asiatica for regulating the condition of mammalian skin, especially for regulating tactile and/or visible signs of skin aging, e.g., ameliorating lines and wrinkles and prophylactically treating loss of elasticity. The present invention also relates to a method for prophylactically treating tactile and/or visible signs of loss of skin elasticity, including loss of elasticity associated with skin aging, involving the topical application of a composition containing substantially pure asiatic acid as the active agent for said regulation. In a preferred embodiment, the active consists essentially of substantially pure asiatic acid, more preferably the active consists of substantially pure asiatic acid.

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METHODS OF REGULATING SKIN CONDITION WITH CENTELLA ASIATICA EXTRACT

TECHNICAL FIELD

The present invention relates to the field of regulating the condition of skin by topical application of cosmetic compositions such as lotions, creams, moisturizers, etc. More specifically, the invention relates to regulating tactile and/or visible discontinuities in skin texture, e.g., due to skin aging, and regulating skin elasticity.

CROSS REFERENCES

This application claims priority under Title 35, United States Code 119(e) from Provisional Application Serial No. 60/016,043, filed April 23, 1996, Provisional Application Serial No. 60/025,242, filed September 16, 1996, and Provisional Application Serial No. 60/028,902, filed October 21, 1996.

BACKGROUND OF THE INVENTION

Many personal care products currently available to consumers are directed primarily to improving the health and/or physical appearance of the skin. Among these skin care products, many are directed to delaying, minimizing or even eliminating skin wrinkling and other histological changes typically associated with the aging of skin or environmental damage to human skin.

Skin is subject to insults by many extrinsic and intrinsic factors. Extrinsic factors include ultraviolet radiation, heat, wind, low humidity, harsh surfactants, abrasives, and the like. Intrinsic factors include chronological aging and other biochemical changes from within the skin. Whether extrinsic or intrinsic, these factors result in visible signs of skin aging, such as wrinkling and other histological changes associated with skin aging. To many people, skin wrinkles are a reminder of the disappearance of youth. As a result, the elimination of wrinkles has become a booming business in youth-conscious societies. Treatments range from cosmetic creams and moisturizers to various forms of cosmetic surgery.

Extrinsic or intrinsic factors may result in the thinning and general degradation of the skin. For example, as the skin naturally ages, there is a reduction in the cells and blood vessels that supply the skin. There is also a flattening of the dermal-epidermal

junction which results in weaker mechanical resistance of this junction. See, for example, Oikarinen, "The Aging of Skin: Chronoaging Versus Photoaging," Photodermatol. Photoimmunol. Photomed., vol. 7, pp. 3-4, 1990, which is incorporated by reference herein in its entirety.

Topical compositions containing Centella asiatica are known. See, for example, French patent No. 1433383, French patent No. 4209M, French patent Application No. 2594690 and French patent Application No. 2696932.

It has now been found that Centella asiatica extracts provide benefits in regulating the tactile and/or visible perception of skin previously unrecognized in the art. For example, Centella asiatica extract can ameliorate the tactile and/or visible perception of skin texture discontinuities, including fine lines, wrinkles and other skin texture discontinuities associated with aged skin. Centella asiatica extract, and especially asiatic acid, can delay, minimize or prevent loss of skin elasticity, including elasticity loss associated with aging skin, such that signs of loss of elasticity are delayed, minimized, or prevented.

It is therefore an object of the present invention to provide a method for regulating the tactile and/or visible perception of mammalian skin (especially of human skin, more especially facial skin), involving the topical application of a composition containing Centella asiatica extract.

It is another object of the present invention to provide a method for ameliorating the tactile and/or visible perception of skin texture discontinuities, including fine lines, wrinkles and other skin texture discontinuities associated with aged skin, involving the topical application of a composition containing Centella asiatica extract.

It is another object of the present invention to provide a method for prophylactically treating loss of skin elasticity, including elasticity loss associated with aging skin, such that tactile and/or visible signs of loss of elasticity are delayed, minimized or prevented, the method involving the topical application of a composition containing Centella asiatica extract, especially asiatic acid. Tactile and/or visible signs of loss of skin elasticity include skin sagging, loss of firmness, loss of tightness and loss of recoil from deformation.

These and other objects of this invention will become apparent in light of the following disclosure.

SUMMARY OF THE INVENTION

The present invention relates to a method of ameliorating tactile and/or visible discontinuities in mammalian skin texture, including texture discontinuities associated with aged skin, involving the topical application of a composition containing Centella

asiatica extract as the active agent for said amelioration. Skin texture discontinuities include skin lines and wrinkles. In a preferred embodiment, the active consists essentially of Centella asiatica extract, more preferably the active consists of Centella asiatica extract.

The present invention also relates to a method for prophylactically treating tactile and/or visible signs of loss of skin elasticity, including loss of elasticity associated with skin aging, involving the topical application of a composition containing Centella asiatica extract as the active agent for said treatment. Tactile and/or visible signs of loss of skin elasticity include skin sagging, loss of firmness, loss of tightness and loss of recoil from deformation. In a preferred embodiment, the active consists essentially of Centella asiatica extract, more preferably the active consists of Centella asiatica extract.

The present invention also relates to a method for prophylactically treating tactile and/or visible signs of loss of skin elasticity, including loss of elasticity associated with skin aging, involving the topical application of a composition containing substantially pure asiatic acid as the active agent for said regulation. In a preferred embodiment, the active consists essentially of substantially pure asiatic acid, more preferably the active consists of substantially pure asiatic acid.

The topical compositions of the present invention preferably include a carrier for the above mentioned actives.

DETAILED DESCRIPTION OF THE INVENTION

All percentages and ratios used herein are by weight of the total composition and all measurements made are at 25°C, unless otherwise designated.

The compositions of the present invention can comprise, consist essentially of, or consist of, the essential as well as optional ingredients and components described herein. As used herein, "consisting essentially of" means that the composition or component may include additional ingredients, but only if the additional ingredients do not materially alter the basic and novel characteristics of the claimed compositions or methods.

All publications cited herein are hereby incorporated by reference in their entirety.

The term "topical application", as used herein, means to apply or spread the compositions of the present invention onto the surface of the skin.

The term "dermatologically-acceptable," as used herein, means that the compositions or components thereof so described are suitable for use in contact with human skin without undue toxicity, incompatibility, instability, allergic response, and the like.

The term "safe and effective amount" as used herein means an amount of a compound or composition sufficient to significantly induce a positive benefit, preferably

a positive skin appearance benefit, but low enough to avoid serious side effects, i.e., to provide a reasonable benefit to risk ratio, within the scope of sound judgment of the skilled artisan.

The compositions of the present invention are useful for topical application and for regulating skin condition, especially signs of skin aging. "Regulating the signs of skin aging" includes prophylactically treating and ameliorating one or more of such signs.

"Signs of skin aging" include, but are not limited to, all outward visible and tactilely perceptible manifestations as well as any other macro or micro effects due to skin aging. Such signs may be induced or caused by extrinsic factors or intrinsic factors, e.g., chronological aging and/or environmental damage. These signs may result from processes which include, but are not limited to, the development of textural discontinuities such as wrinkles, including both fine superficial wrinkles and coarse deep wrinkles, skin lines, crevices, bumps, pores and/or other forms of skin unevenness or roughness, sagging (including puffiness in the eye area, and jowls), loss of skin firmness, loss of skin tightness, loss of skin recoil from deformation, discoloration (including undereye circles), blotching, sallowness, hyperpigmented skin regions such as age spots and freckles, keratoses, hyperkeratinization, elastosis, collagen breakdown, and other histological changes in the stratum corneum, dermis, epidermis, the skin vascular system (e.g., telangiectasia or spider vessels), and underlying tissues, especially those proximate to the skin.

The present invention is especially useful for ameliorating tactile and/or visible discontinuities in mammalian skin texture associated with skin aging. As used herein, "ameliorating discontinuities in the texture of mammalian skin associated with skin aging" includes diminishing, minimizing and/or effacing undesired discontinuities in the texture of mammalian skin associated with skin aging, to thereby provide improved skin texture, e.g., a smoother, more even texture. Such discontinuities in skin texture include crevices, bumps, pores, lines, wrinkles and/or other forms of unevenness or roughness associated with skin aging. E.g., the size of pores, lines and/or wrinkles is decreased.

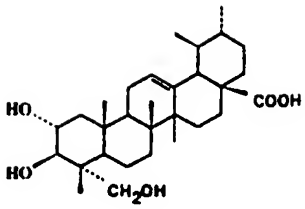
The present invention is also especially useful for prophylactically treating loss of skin elasticity and/or the tactile and/or visible signs of loss of skin elasticity associated with skin aging. Prophylactically treating loss of skin elasticity associated with skin aging and such signs thereof includes delaying, minimizing and/or preventing such loss of elasticity and signs thereof. Such signs of loss of elasticity include skin sagging, loss of skin firmness, loss of skin tightness and loss of skin recoil from deformation. E.g., the present invention helps to keep skin firm, tight, and supple. As used herein, "loss of elasticity" involves the loss of functional elastin in the dermis. Without intending to be

bound or otherwise limited by theory, it is believed that the loss of functional elastin results from a degradation of existing functional elastin, generally by the action of a proteolytic enzyme such as elastase.

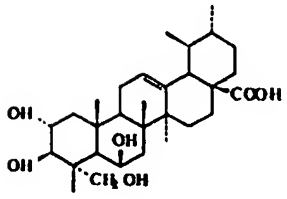
Primary active

The compositions of the present invention contain, as a primary active for regulating skin appearance, an extract of the plant Centella asiatica. Centella asiatica is also known as Hydrocotyle asiatica, Gotu Kola, and Indian Pennyworth. "Extract of Centella asiatica" is intended to include both natural extracts, purified versions of the extracts, and synthetic equivalents thereof. The primary active preferably consists essentially of an extract of Centella asiatica and more preferably consists of an extract of Centella asiatica.

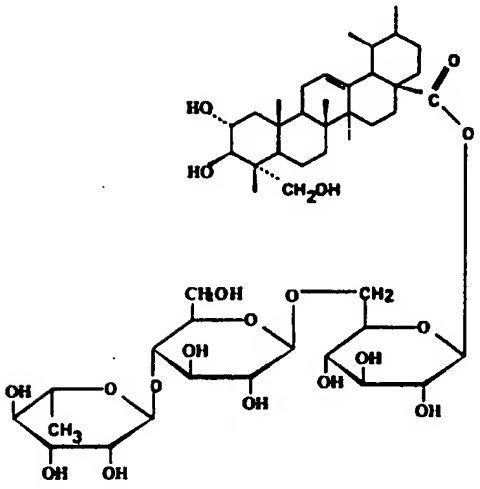
Extracts of Centella asiatica are well known to contain one or more of the pentacyclic triterpenoids asiatic acid, madecassic acid, and their glycosolated forms asiaticoside and madecassoside. These components of Centella asiatica extract correspond to the following structures:



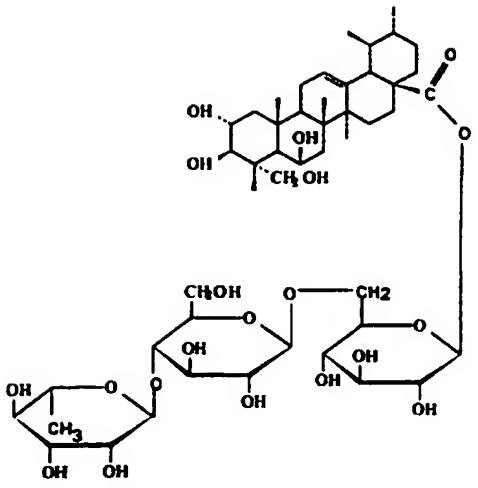
asiatic acid



madecassic acid



asiaticoside



madecassoside

The Centella asiatica extract is preferably substantially pure. By "substantially pure" it is meant that the extract contains in total at least about 80 wt% of one or more of the triterpenoids asiatic acid, madecassic acid, asiaticoside, and madecassoside. The extract contains in total more preferably at least about 90 wt% , most preferably at least about 95 wt%, of one or more of said triterpenoids.

Centella asiatica extracts, including asiatic acid, are commercially available from MMP, Inc. of South Plainfield, New Jersey, U.S.A.. For example, such extracts are available from MMP, Inc. under the tradenames CENTASIATIC, ETCA, EPCA,

GENINES AMEL, and HETEROSIDES.

CENTASIATIC is freeze-dried, highly purified asiatic acid extracted from Centella asiatica, having the C.T.F.A. name asiatic acid and C.A.S. Number 464-92-6. CENTASIATIC contains ≥ 95.0% asiatic acid, is insoluble in water and soluble in propylene glycol and at 2% (w/v) in ethanol. CENTELLA ASIATICA E.T.C.A. is a freeze-dried, titrated extract of Centella asiatica, rich in asiaticoside, asiatic acid and madecassic acid, having the C.T.F.A. name Centella asiatica extract and the C.A.S. Numbers 16830-15-2, 464-92-6, and 18449-41-7. CENTELLA ASIATICA E.T.C.A. contains about 36-44% asiaticoside; about 54-66% free genins (asiatic acid and madecassic acid), and at least about 95% asiaticoside and free genins. It is insoluble in water and glycerol, soluble in propylene glycol and methanol, and poorly soluble in ethanol. CENTELLA ASIATICA E.P.C.A. is a freeze-dried, purified extract of Centella asiatica, containing asiaticoside, madecassoside, asiatic acid and madecassic acid, having the C.T.F.A. name Hydrocotyle asiatica extract and C.A.S. Numbers 16830-15-2, 34540-22-2, 464-92-6, and 18449-41-7. CENTELLA ASIATICA E.P.C.A. typically contains about 18% asiaticoside, about 18% madecassoside, about 5% asiatic acid, about 20% sodium chloride and about 34% inert material. It is soluble in propylene glycol and at 70% (w/v) in ethanol, and partially soluble in water. CENTELLA ASIATICA GENINES AMEL is an extract of Centella asiatica, rich in asiatic acid and madecassic acid, having the C.T.F.A. name of Centella asiatica extract and the C.A.S. Numbers of 464-92-6 and 18449-41-7. CENTELLA ASIATICA GENINES AMEL typically contains about 25% asiatic acid and about 55% madecassic acid. It is soluble in propylene glycol and at 2% (w/v) in ethanol. CENTELLA ASIATICA HETEROSIDES is a freeze-dried, water soluble extract of Centella asiatica, containing the heterosidic fraction, asiaticoside and madecassoside, having the C.T.F.A. name Centella asiatica extract and C.A.S. Numbers 16830-15-2 and 34540-22-2. CENTELLA ASIATICA HETEROSIDES typically contains about 20% asiaticoside and about 60% madecassoside.

Alternatively, Centella asiatica extracts can be prepared from the plant Centella asiatica by extraction techniques such as are well known in the art, including extractions in hydrophobic and hydrophilic solvents. For example, dried plant leaves are allowed to soak for 24 hours in diethyl ether (or other hydrophobic solvent) after which the leaves are removed. The leaves are further soaked in 100% ethanol (or other hydrophilic solvent) for an additional 24 hours. The ether and alcohol extractions are pooled together and concentrated by evaporation to yield a crude extract of Centella asiatica which contains the free acids as well as the saponins (glycosylated forms).

For ameliorating discontinuities in skin texture associated with skin aging, the Centella asiatica extract preferably contains asiatic acid and one or more of madecassic acid, asiaticoside and madecassoside. More preferably, the Centella asiatica extract contains asiatic acid, madecassic acid, and optionally asiaticoside and/or madecassoside.

For prophylactically treating loss of skin elasticity or signs thereof, the Centella asiatica extract preferably contains asiatic acid. The other components of the Centella asiatica extract may also be present. However, for this purpose the Centella extract is more preferably substantially pure asiatic acid.

The compositions of the present invention contain a safe and effective amount of an extract of Centella asiatica. The compositions of the present invention preferably contain from about 0.01% to about 50%, more preferably from about 0.1% to about 10%, even more preferably from about 0.5% to about 10%, and most preferably from about 1% to about 5% of the Centella asiatica extract.

Carrier

The compositions of the present invention preferably contain a dermatologically acceptable carrier within which the Centella asiatica extract is incorporated to enable the extract and optional other actives to be delivered to the skin at an appropriate concentration. The carrier can thus act as a diluent, dispersant, solvent, or the like for the active(s) which ensures that it can be applied to and distributed evenly over the selected target at an appropriate concentration.

The carrier may contain one or more dermatologically acceptable solid, semi-solid or liquid fillers, diluents, solvents, extenders and the like. The carrier may be solid, semi-solid or liquid. The carrier can itself be inert or it can possess dermatological benefits of its own. Concentrations of the carrier can vary with the carrier selected and the intended concentrations of the essential and optional components.

Suitable carriers for use in the compositions include conventional or otherwise known carriers that are dermatologically acceptable. The carrier should also be physically and chemically compatible with the essential components described herein, and should not unduly impair stability, efficacy or other use benefits associated with the compositions of the present invention. Preferred components of the compositions of this invention should be capable of being comingled in a manner such that there is no interaction which would substantially reduce the efficacy of the composition under ordinary use situations.

The type of carrier utilized in the present invention depends on the type of product form desired for the composition. The topical compositions useful in the subject invention may be made into a wide variety of product forms. These include, but are not

limited to, lotions, creams, gels, sticks, sprays, ointments, pastes, mousses and cosmetics (e.g., solid, semi-solid, or liquid make-up, including foundations, eye-makeup, lipsticks and the like). These product forms may comprise several types of carriers including, but not limited to, solutions, aerosols, emulsions, gels, solids, and liposomes.

Preferred carriers contain a dermatologically acceptable, hydrophilic diluent. As used herein, "diluent" includes materials in which the Centella asiatica extract can be dispersed, dissolved, or otherwise incorporated. Hydrophilic diluents include water, organic hydrophilic diluents such as lower monovalent alcohols (e.g., C_1 - C_4) and low molecular weight glycols and polyols, including propylene glycol, polyethylene glycol (e.g., Molecular Weight 200-600 g/mole), polypropylene glycol (e.g., Molecular Weight 425-2025 g/mole), glycerol, butylene glycol, 1,2,4-butanetriol, sorbitol esters, 1,2,6-hexanetriol, ethanol, isopropanol, sorbitol esters, butanediol, ether propanol, ethoxylated ethers, propoxylated ethers and combinations thereof. Water is a preferred diluent. The composition preferably comprises from about 80% to about 99.99% of the hydrophilic diluent and the Centella asiatica extract in the above described amounts. The compositions may additionally or alternatively include a hydrophobic diluent.

Solutions according to the subject invention typically include a dermatologically acceptable hydrophilic diluent. Solutions useful in the subject invention preferably contain from about 80% to about 99.99% of the hydrophilic diluent and the Centella asiatica extract in the above described amounts.

Aerosols according to the subject invention can be formed by adding a propellant to a solution such as described above. Exemplary propellants include chloro-fluorinated lower molecular weight hydrocarbons. Additional propellants that are useful herein are described in Sagarin, Cosmetics Science and Technology, 2nd Edition, Vol. 2, pp. 443-465 (1972), incorporated herein by reference. Aerosols are typically applied to the skin as a spray-on product.

Preferred carriers comprise an emulsion such as oil-in-water emulsions, water-in-oil emulsions, and water-in-silicone emulsions. As will be understood in the art, depending on the water solubility of a particular Centella asiatica extract and other formulation ingredients, substantially all of the extract will distribute into the water or oil/silicone phase. In a preferred embodiment, substantially all of the Centella asiatica extract distributes into the aqueous phase.

Emulsions according to the present invention generally contain a solution as described above and a lipid or oil. Lipids and oils may be derived from animals, plants, or petroleum and may be natural or synthetic. Preferred emulsions also contain a humectant, such as glycerol. Emulsions will preferably further contain from about 1% to

about 10%, more preferably from about 2% to about 5%, of an emulsifier, based on the weight of the carrier. Emulsifiers may be nonionic, anionic or cationic. Suitable emulsifiers are disclosed in, for example, U.S. Patent 3,755,560, issued August 28, 1973, Dickert et al.; U.S. Patent 4,421,769, issued December 20, 1983, Dixon et al.; and McCutcheon's Detergents and Emulsifiers, North American Edition, pages 317-324 (1986), each incorporated herein by reference.

The emulsion may also contain an anti-foaming agent to minimize foaming upon application to the skin. Anti-foaming agents include high molecular weight silicones and other materials well known in the art for such use.

Suitable emulsions may have a wide range of viscosities, depending on the desired product form. Exemplary low viscosity emulsions have a viscosity of about 50 centistokes or less, more preferably about 10 centistokes or less, most preferably about 5 centistokes or less.

Preferred water-in-silicone and oil-in-water emulsions are described in greater detail below.

a) Water-in-silicone emulsion

Water-in-silicone emulsions contain a continuous silicone phase and a dispersed aqueous phase. The Centella asiatica extract may distribute into either of these phases, depending on the water-solubility/dispersibility of the particular extract and other formulation ingredients as will be understood by those skilled in the art. Other materials such as described herein may also be incorporated into one or both of these phases. For example, water soluble or dispersible materials may be distributed in the aqueous phase; oil soluble materials may be distributed in the silicone phase.

(i) Continuous silicone phase

A preferred topical carrier for use in the compositions of the present invention are water-in-silicone emulsions comprising from about 1% to about 60%, preferably from about 5% to about 40%, more preferably from about 10% to about 20%, of a continuous silicone phase by weight of the topical carrier.

The continuous silicone phase preferably contains a liquid organopolysiloxane. Suitable liquid organopolysiloxanes are those having a melting point of about 25°C or less under about 1 atmosphere of pressure. The liquid organopolysiloxane can be selected from a wide variety of silicones spanning a broad range of volatilities and viscosities. Examples of organopolysiloxanes include polyalkylsiloxanes, cyclic polyalkylsiloxanes, and polyalkylarylsiloxanes.

The polyalkylsiloxanes useful herein include, for example, polyalkylsiloxanes with viscosities of from about 0.5 to about 1,000,000 centistokes at 25°C. Such

polyalkylsiloxanes correspond to the general chemical formula $R_3SiO[R_2SiO]_xSiR_3$ wherein R is an alkyl group having from one to about 30 carbon atoms (preferably R is methyl or ethyl, more preferably methyl; also mixed alkyl groups can be used in the same molecule), and x is an integer from 0 to about 10,000, chosen to achieve the desired molecular weight which can range to over about 10,000,000. Commercially available polyalkylsiloxanes include the polydimethylsiloxanes, which are also known as dimethicones, nonlimiting examples of which include the Vicasil® series sold by General Electric Company and the Dow Corning® 200 series sold by Dow Corning Corporation. Specific examples of polydimethylsiloxanes useful herein include Dow Corning® 200 fluid having a viscosity of 0.65 centistokes and a boiling point of 100°C, Dow Corning® 225 fluid having a viscosity of 10 centistokes and a boiling point greater than 200°C, and Dow Corning® 200 fluids having viscosities of 50, 350, and 12,500 centistokes, respectively, and boiling points greater than 200°C. Also, useful are dimethicones having pendant alkyl groups ranging from C2 to about C30, these materials can be designated by the formula $(CH_3)_3SiO[(CH_3)_2SiO]_x[CH_3RSiO]_ySi(CH_3)_3$ wherein R is straight or branched chain alkyl having from two to about 30 carbon atoms and x and y are each integers of 1 or greater selected to achieve the desired molecular weight which can range to over about 10,000,000. Examples of these alkyl-substituted dimethicones include cetyl dimethicone and lauryl dimethicone.

Cyclic polyalkylsiloxanes useful herein include those corresponding to the general chemical formula $[SiR_2\text{-}O]_n$ wherein R is an alkyl group (preferably R is methyl or ethyl, more preferably methyl) and n is an integer from about 3 to about 8, more preferably n is an integer from about 3 to about 7, and most preferably n is an integer from about 4 to about 6. When R is methyl, these materials are typically referred to as cyclomethicones. Commercially available cyclomethicones include Dow Corning® 244 fluid having a viscosity of 2.5 centistokes, and a boiling point of 172°C, which primarily contains the cyclomethicone tetramer (i.e. n=4), Dow Corning® 344 fluid having a viscosity of 2.5 centistokes and a boiling point of 178°C, which primarily contains the cyclomethicone pentamer (i.e. n=5), Dow Corning® 245 fluid having a viscosity of 4.2 centistokes and a boiling point of 205°C, which primarily contains a mixture of the cyclomethicone tetramer and pentamer (i.e. n=4 and 5), and Dow Corning® 345 fluid having a viscosity of 4.5 centistokes and a boiling point of 217°, which primarily contains a mixture of the cyclomethicone tetramer, pentamer, and hexamer (i.e. n=4, 5, and 6).

Also useful are materials such as trimethylsiloxysilicate, which is a polymeric material corresponding to the general chemical formula $[(CH_2)_3SiO_{1/2}]_x[SiO_2]_y$, wherein x is an integer from about 1 to about 500 and y is an integer from about 1 to

about 500. A commercially available trimethylsiloxysilicate is sold as a mixture with dimethicone as Dow Corning® 593 fluid.

Also useful herein are dimethiconols, which are hydroxy terminated dimethyl silicones. These materials can be represented by the general chemical formulas $R_3SiO[R_2SiO]_xSiR_2OH$ and $HOR_2SiO[R_2SiO]_xSiR_2OH$ wherein R is an alkyl group (preferably R is methyl or ethyl, more preferably methyl) and x is an integer from 0 to about 500, chosen to achieve the desired molecular weight. Commercially available dimethiconols are typically sold as mixtures with dimethicone or cyclomethicone (e.g. Dow Corning® 1401, 1402, and 1403 fluids).

Also useful herein are polyalkylaryl siloxanes, with polymethylphenyl siloxanes having viscosities from about 15 to about 65 centistokes at 25°C being preferred. These materials are available, for example, as SF 1075 methylphenyl fluid (sold by General Electric Company) and 556 Cosmetic Grade phenyl trimethicone fluid (sold by Dow Corning Corporation).

Preferred for use herein are organopolysiloxanes selected from the group consisting of polyalkylsiloxanes, alkyl substituted dimethicones, cyclomethicones, trimethylsiloxysilicates, dimethiconols, polyalkylaryl siloxanes, and mixtures thereof. More preferred for use herein are polyalkylsiloxanes and cyclomethicones. Preferred among the polyalkylsiloxanes are dimethicones.

(ii) Aqueous dispersed phase

The preferred water-in-silicone emulsions comprise from about 30% to about 90%, preferably from about 50% to about 85%, most preferably from about 70% to about 80%, of a dispersed aqueous phase by weight of the topical carrier. In emulsion technology, the term "dispersed phase" is a term well-known to one skilled in the art which means that the phase exists as small particles or droplets that are suspended in and surrounded by a continuous phase. The dispersed phase is also known as the internal or discontinuous phase.

(iii) Emulsifier For Dispersing The Phases

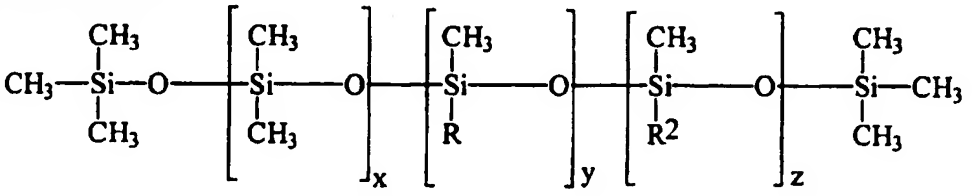
The preferred water-in-silicone emulsions comprise from about 0.1% to about 10%, preferably from about 0.5% to about 7.5%, more preferably from about 1% to about 5%, of an emulsifier for dispersing the discontinuous aqueous phase into the continuous silicone phase (percentages by weight of the topical carrier).

A wide variety of emulsifying agents can be employed herein to form the preferred water-in-silicone emulsion. Mixtures of emulsifying agents are also useful. These emulsifiers include those selected from the group consisting of silicone emulsifiers, non-silicon-containing emulsifiers, and mixtures thereof. Preferably these emulsifiers

have an HLB value of less than about 14, more preferably from about 2 to about 14, and most preferably from about 4 to about 14. It is found that emulsifiers having an HLB value outside of these ranges can be utilized if they are used in combination with other emulsifiers, so to achieve an effective weighted average HLB for the combination that falls within the ranges described in the previous sentence. The abbreviation, "HLB," stands for hydrophilic lipophilic balance. The HLB system is well known to one of ordinary skill in the art and is described in detail in "The HLB System, A Time-Saving Guide to Emulsifier Selection," ICI Americas Inc., August 1984, which is incorporated herein by reference in its entirety.

A wide variety of silicone emulsifiers are useful herein. These silicone emulsifiers are typically organically modified organopolysiloxanes. These materials are also known to those skilled in the art as silicone surfactants. Useful silicone emulsifiers include dimethicone copolyols. These materials are polydimethyl siloxanes which have been modified to include polyether side chains such as polyethylene oxide chains, polypropylene oxide chains, mixtures of these chains, and polyether chains containing moieties derived from both ethylene oxide and propylene oxide. Other examples include alkyl-modified dimethicone copolyols, i.e. compounds which contain C2-C30 pendant side chains. Still other useful dimethicone copolyols include materials having various cationic, anionic, amphoteric, and zwiterionic pendant moieties.

These dimethicone copolyols useful herein can be described by the following general structure:



wherein R is C1-C30 straight, branched, or cyclic alkyl and R^2 is selected from the group consisting of

$$--(CH_2)_n--O--(CH_2CHR^3O)_m--H,$$

and

$$--(CH_2)_n--O--(CH_2CHR^3O)_m--(CH_2CHR^4O)_o--H,$$

wherein n is an integer from 3 to about 10; R^3 and R^4 are selected from the group consisting of H and C1-C6 straight or branched chain alkyl such that R^3 and R^4 are not simultaneously the same; and m, o, x, and y are selected such that the molecule has an overall molecular weight from about 200 to about 10,000,000, with m, o, x, and y being independently selected from integers of zero or greater such that m and o are not both simultaneously zero, and z being independently selected from integers of 1 or greater. It

is recognized that positional isomers of these copolyols can be achieved. The chemical representations depicted above for the R^2 moieties containing the R^3 and R^4 groups are not meant to be limiting but are shown as such for convenience.

Also useful herein, although not strictly classified as dimethicone copolyols, are silicone surfactants as depicted in the structures in the previous paragraph wherein R^2 is:

$$--(CH_2)_n--O--R^5,$$

wherein R^5 is a cationic, anionic, amphoteric, or zwiterionic moiety.

Nonlimiting examples of dimethicone copolyols and other silicone surfactants useful as emulsifiers herein include polydimethylsiloxane polyether copolymers with pendant polyethylene oxide sidechains, polydimethylsiloxane polyether copolymers with pendant polypropylene oxide sidechains, polydimethylsiloxane polyether copolymers with pendant mixed polyethylene oxide and polypropylene oxide sidechains, polydimethylsiloxane polyether copolymers with pendant mixed poly(ethylene)(propylene)oxide sidechains, polydimethylsiloxane polyether copolymers with pendant organobetaine sidechains, polydimethylsiloxane polyether copolymers with pendant carboxylate sidechains, polydimethylsiloxane polyether copolymers with pendant quaternary ammonium sidechains; and also further modifications of the preceding copolymers containing pendant C2-C30 straight, branched, or cyclic alkyl moieties. Examples of commercially available dimethicone copolyols useful herein sold by Dow Corning Corporation are Dow Corning® 190, 193, Q2-5220, 2501 Wax, 2-5324 fluid, and 3225C (this later material being sold as a mixture with cyclomethicone). Cetyl dimethicone copolyol is commercially available as a mixture with polyglyceryl-4 isostearate (and) hexyl laurate and is sold under the tradename ABIL® WE-09 (available from Goldschmidt). Cetyl dimethicone copolyol is also commercially available as a mixture with hexyl laurate (and) polyglyceryl-3 oleate (and) cetyl dimethicone and is sold under the tradename ABIL® WS-08 (also available from Goldschmidt). Other nonlimiting examples of dimethicone copolyols also include lauryl dimethicone copolyol, dimethicone copolyol acetate, diemthicone copolyol adipate, dimethicone copolyolamine, dimethicone copolyol behenate, dimethicone copolyol butyl ether, dimethicone copolyol hydroxy stearate, dimethicone copolyol isostearate, dimethicone copolyol laurate, dimethicone copolyol methyl ether, dimethicone copolyol phosphate, and dimethicone copolyol stearate. See International Cosmetic Ingredient Dictionary, Fifth Edition, 1993, which is incorporated by reference herein in its entirety.

The dimethicone copolyol emulsifiers useful herein are further described in U.S. Patent No. 4,960,764, to Figueroa, Jr. et al., issued October 2, 1990; European Patent No. EP 330,369, to SanoGueira, published August 30, 1989; G.H. Dahms, et al., "New

Formulation Possibilities Offered by Silicone Copolyols," Cosmetics & Toiletries, vol. 110, pp. 91-100, March 1995; M.E. Carlotti et al., "Optimization of W/O-S Emulsions And Study Of The Quantitative Relationships Between Ester Structure And Emulsion Properties," J. Dispersion Science And Technology, 13(3), 315-336 (1992); P. Hameyer, "Comparative Technological Investigations of Organic and Organosilicone Emulsifiers in Cosmetic Water-in-Oil Emulsion Preparations," *HAPPI* 28(4), pp. 88-128 (1991); J. Smid-Korbar et al., "Efficiency and usability of silicone surfactants in emulsions," Provisional Communication, International Journal of Cosmetic Science, **12**, 135-139 (1990); and D.G. Krzysik et al., "A New Silicone Emulsifier For Water-in-Oil Systems," Drug and Cosmetic Industry, vol. 146(4) pp. 28-81 (April 1990); which have already been incorporated by reference herein in their entirety.

Among the non-silicon-containing emulsifiers useful herein are various non-ionic and anionic emulsifying agents such as sugar esters and polyesters, alkoxylated sugar esters and polyesters, C1-C30 fatty acid esters of C1-C30 fatty alcohols, alkoxylated derivatives of C1-C30 fatty acid esters of C1-C30 fatty alcohols, alkoxylated ethers of C1-C30 fatty alcohols, polyglyceryl esters of C1-C30 fatty acids, C1-C30 esters of polyols, C1-C30 ethers of polyols, alkyl phosphates, polyoxyalkylene fatty ether phosphates, fatty acid amides, acyl lactylates, soaps, and mixtures thereof. See McCutcheon's, Detergents and Emulsifiers, North American Edition (1986), published by Allured Publishing Corporation; U.S. Patent No. 5,011,681 to Ciotti et al., issued April 30, 1991; U.S. Patent No. 4,421,769 to Dixon et al., issued December 20, 1983; and U.S. Patent No. 3,755,560 to Dickert et al., issued August 28, 1973; these four references are incorporated herein by reference in their entirety.

Nonlimiting examples of these non-silicon-containing emulsifiers include: polyethylene glycol 20 sorbitan monolaurate (Polysorbate 20), polyethylene glycol 5 soya sterol, Steareth-20, Ceteareth-20, PPG-2 methyl glucose ether distearate, Ceteth-10, Polysorbate 80, cetyl phosphate, potassium cetyl phosphate, diethanolamine cetyl phosphate, Polysorbate 60, glyceryl stearate, PEG-100 stearate, polyoxyethylene 20 sorbitan trioleate (Polysorbate 85), sorbitan monolaurate, polyoxyethylene 4 lauryl ether sodium stearate, polyglyceryl-4 isostearate, hexyl laurate, steareth-20, ceteareth-20, PPG-2 methyl glucose ether distearate, ceteth-10, diethanolamine cetyl phosphate, glyceryl stearate, PEG-100 stearate, and mixtures thereof.

b) Oil-in-Water Emulsions

Other preferred topical carriers include oil-in-water emulsions, having a continuous aqueous phase and a hydrophobic, water-insoluble phase ("oil phase") dispersed therein. The Centella asiatica extract may distribute into either of these phases, depending on the

water-solubility/dispersibility of the particular extract and other formulation ingredients as will be understood by those skill in the art. Other materials such as described herein may also be incorporated into one or both of these phases. For example, water soluble or dispersible materials may be distributed in the aqueous phase; water insoluble materials may be distributed in the hydrophobic phase. An especially preferred oil-in-water emulsion, containing a structuring agent, hydrophilic surfactant and water, is described in detail hereinafter.

(i) Structuring Agent

A preferred oil-in-water emulsion comprises a structuring agent to assist in the formation of a liquid crystalline gel network structure. Concentrations of such structuring agents are from about 1% to about 20%, preferably from about 1% to about 10%, more preferably from about 3% to about 9% by weight of the topical carrier.

Suitable structuring agents are those selected from the group consisting of saturated C_{16} to C_{30} fatty alcohols, saturated C_{16} to C_{30} fatty alcohols containing from about 1 to about 5 moles of ethylene oxide, saturated C_{16} to C_{30} diols, saturated C_{16} to C_{30} monoglycerol ethers, saturated C_{16} to C_{30} hydroxy fatty acids, and mixtures thereof, having a melting point of at least about 45°C.

Preferred structuring agents include stearyl alcohol, cetyl alcohol, behenyl alcohol, stearic acid, palmitic acid, the polyethylene glycol ether of stearyl alcohol having an average of about 1 to about 5 ethylene oxide units, the polyethylene glycol ether of cetyl alcohol having an average of about 1 to about 5 ethylene oxide units, and mixtures thereof. More preferred structuring agents of the present invention are selected from the group consisting of stearyl alcohol, cetyl alcohol, behenyl alcohol, the polyethylene glycol ether of stearyl alcohol having an average of about 2 ethylene oxide units (steareth-2), the polyethylene glycol ether of cetyl alcohol having an average of about 2 ethylene oxide units, and mixtures thereof. Even more preferred structuring agents are selected from the group consisting of stearyl alcohol, cetyl alcohol, behenyl alcohol, steareth-2, and mixtures thereof. Most preferred is steareth-2, available under the tradename of Brij® 72 from ICI Americas.

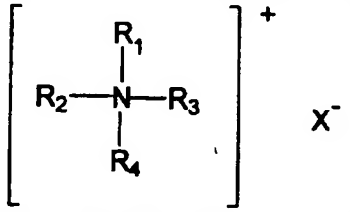
(ii) Hydrophilic surfactant

The preferred oil-in-water emulsions comprise from about 0.05% to about 10%, preferably from about 1% to about 6%, and more preferably from about 1% to about 3% of at least one hydrophilic surfactant which can disperse the hydrophobic materials in the water phase (percentages by weight of the topical carrier). The surfactant, at a minimum, must be hydrophilic enough to disperse in water.

Suitable surfactants include any of a wide variety of known cationic, anionic, zwitterionic, and amphoteric surfactants. See McCutcheon's, Detergents and Emulsifiers, North American Edition (1986), published by Allured Publishing Corporation; U.S. Patent 5,011,681; U.S. Patent 4,421,769; and U.S. Patent 3,755,560; these four references are incorporated herein by reference in their entirety.

The exact surfactant chosen will depend upon the pH of the composition and the other components present.

Preferred are cationic surfactants, especially dialkyl quaternary ammonium compounds, examples of which are described in U.S. Patent 5,151,209; U.S. Patent 5,151,210; U.S. Patent 5,120,532; U.S. Patent 4,387,090; U.S. Patent 3,155,591; U.S. Patent 3,929,678; U.S. Patent 3,959,461; McCutcheon's, Detergents & Emulsifiers, (North American edition 1979) M.C. Publishing Co.; and Schwartz, et al., Surface Active Agents, Their Chemistry and Technology, New York: Interscience Publishers, 1949; which descriptions are incorporated herein by reference. The cationic surfactants useful herein include cationic ammonium salts such as those having the formula:



wherein R_1, is an alkyl group having from about 12 to about 30 carbon atoms, or an aromatic, aryl or alkaryl group having from about 12 to about 30 carbon atoms; R_2, R_3, and R_4 are independently selected from hydrogen, an alkyl group having from about 1 to about 22 carbon atoms, or aromatic, aryl or alkaryl groups having from about 12 to about 22 carbon atoms; and X is any compatible anion, preferably selected from the group consisting of chloride, bromide, iodide, acetate, phosphate, nitrate, sulfate, methyl sulfate, ethyl sulfate, tosylate, lactate, citrate, glycolate, and mixtures thereof. Additionally, the alkyl groups of R_1, R_2, R_3, and R_4 can also contain ester and/or ether linkages, or hydroxy or amino group substituents (e.g., the alkyl groups can contain polyethylene glycol and polypropylene glycol moieties).

More preferably, R_1 is an alkyl group having from about 12 to about 22 carbon atoms; R_2 is selected from H or an alkyl group having from about 1 to about 22 carbon atoms; R_3 and R_4 are independently selected from H or an alkyl group having from about 1 to about 3 carbon atoms; and X is as described previously.

Most preferably, R_1 is an alkyl group having from about 12 to about 22 carbon atoms; R_2, R_3, and R_4 are selected from H or an alkyl group having from about 1 to about 3 carbon atoms; and X is as described previously.

Alternatively, other useful cationic emulsifiers include amino-amides, wherein in the above structure R_1 is alternatively $R_5CONH\text{-}(CH_2)_n\text{-}$, wherein R_5 is an alkyl group having from about 12 to about 22 carbon atoms, and n is an integer from about 2 to about 6, more preferably from about 2 to about 4, and most preferably from about 2 to about 3. Nonlimiting examples of these cationic emulsifiers include stearamidopropyl PG-dimonium chloride phosphate, behenamidopropyl PG dimonium chloride, stearamidopropyl ethyldimonium ethosulfate, stearamidopropyl dimethyl (myristyl acetate) ammonium chloride, stearamidopropyl dimethyl cetearyl ammonium tosylate, stearamidopropyl dimethyl ammonium chloride, stearamidopropyl dimethyl ammonium lactate, and mixtures thereof. Especially preferred is behenamidopropyl PG dimonium chloride.

Nonlimiting examples of quaternary ammonium salt cationic surfactants include those selected from the group consisting of cetyl ammonium chloride, cetyl ammonium bromide, lauryl ammonium chloride, lauryl ammonium bromide, stearyl ammonium chloride, stearyl ammonium bromide, cetyl dimethyl ammonium chloride, cetyl dimethyl ammonium bromide, lauryl dimethyl ammonium chloride, lauryl dimethyl ammonium bromide, stearyl dimethyl ammonium chloride, stearyl dimethyl ammonium bromide, cetyl trimethyl ammonium chloride, cetyl trimethyl ammonium bromide, lauryl trimethyl ammonium chloride, lauryl trimethyl ammonium bromide, stearyl trimethyl ammonium chloride, stearyl trimethyl ammonium bromide, lauryl dimethyl ammonium chloride, stearyl dimethyl cetyl ditallow dimethyl ammonium chloride, dicetyl ammonium chloride, dicetyl ammonium bromide, dilauryl ammonium chloride, dilauryl ammonium bromide, distearyl ammonium chloride, distearyl ammonium bromide, dicetyl methyl ammonium chloride, dicetyl methyl ammonium bromide, dilauryl methyl ammonium chloride, dilauryl methyl ammonium bromide, distearyl methyl ammonium chloride, distearyl methyl ammonium bromide, and mixtures thereof. Additional quaternary ammonium salts include those wherein the C_{12} to C_{30} alkyl carbon chain is derived from a tallow fatty acid or from a coconut fatty acid. The term "tallow" refers to an alkyl group derived from tallow fatty acids (usually hydrogenated tallow fatty acids), which generally

have mixtures of alkyl chains in the C_{16} to C_{18} range. The term "coconut" refers to an alkyl group derived from a coconut fatty acid, which generally have mixtures of alkyl chains in the C_{12} to C_{14} range. Examples of quaternary ammonium salts derived from these tallow and coconut sources include ditallow dimethyl ammonium chloride, ditallow dimethyl ammonium methyl sulfate, di(hydrogenated tallow) dimethyl ammonium chloride, di(hydrogenated tallow) dimethyl ammonium acetate, ditallow dipropyl ammonium phosphate, ditallow dimethyl ammonium nitrate, di(coconutalkyl)dimethyl ammonium chloride, di(coconutalkyl)dimethyl ammonium bromide, tallow ammonium chloride, coconut ammonium chloride, stearamidopropyl PG-dimonium chloride phosphate, stearamidopropyl ethyldimonium ethosulfate, stearamidopropyl dimethyl (myristyl acetate) ammonium chloride, stearamidopropyl dimethyl cetearyl ammonium tosylate, stearamidopropyl dimethyl ammonium chloride, stearamidopropyl dimethyl ammonium lactate, and mixtures thereof. An example of a quaternary ammonium compound having an alkyl group with an ester linkage is ditallowyl oxyethyl dimethyl ammonium chloride.

More preferred cationic surfactants are those selected from the group consisting of behenamidopropyl PG dimonium chloride, dilauryl dimethyl ammonium chloride, distearyl dimethyl ammonium chloride, dimyristyl dimethyl ammonium chloride, dipalmityl dimethyl ammonium chloride, distearyl dimethyl ammonium chloride, stearamidopropyl PG-dimonium chloride phosphate, stearamidopropyl ethyldiammonium ethosulfate, stearamidopropyl dimethyl (myristyl acetate) ammonium chloride, stearamidopropyl dimethyl cetearyl ammonium tosylate, stearamidopropyl dimethyl ammonium chloride, stearamidopropyl dimethyl ammonium lactate, and mixtures thereof.

Most preferred cationic surfactants are those selected from the group consisting of behenamidopropyl PG dimonium chloride, dilauryl dimethyl ammonium chloride, distearyl dimethyl ammonium chloride, dimyristyl dimethyl ammonium chloride, dipalmityl dimethyl ammonium chloride, and mixtures thereof.

A preferred combination of cationic surfactant and structuring agent is behenamidopropyl PG dimonium chloride and/or behenyl alcohol, wherein the ratio is preferably optimized to maintained to enhance physical and chemical stability, especially when such a combination contains ionic and/or highly polar solvents. This combination is especially useful for delivery of sunscreening agents such as zinc oxide and octyl methoxycinnamate.

A wide variety of anionic surfactants are also useful herein. See, e.g., U.S. Patent No. 3,929,678, to Laughlin et al., issued December 30, 1975, which is incorporated

herein by reference in its entirety. Nonlimiting examples of anionic surfactants include the alkoyl isethionates, and the alkyl and alkyl ether sulfates. The alkoyl isethionates typically have the formula $RCO\text{-}OCH_2CH_2SO_3M$ wherein R is alkyl or alkenyl of from about 10 to about 30 carbon atoms, and M is a water-soluble cation such as ammonium, sodium, potassium and triethanolamine. Nonlimiting examples of these isethionates include those alkoyl isethionates selected from the group consisting of ammonium cocoyl isethionate, sodium cocoyl isethionate, sodium lauroyl isethionate, sodium stearoyl isethionate, and mixtures thereof.

The alkyl and alkyl ether sulfates typically have the respective formulae $ROSO_3M$ and $RO(C_2H_4O)_xSO_3M$, wherein R is alkyl or alkenyl of from about 10 to about 30 carbon atoms, x is from about 1 to about 10, and M is a water-soluble cation such as ammonium, sodium, potassium and triethanolamine. Another suitable class of anionic surfactants are the water-soluble salts of the organic, sulfuric acid reaction products of the general formula:

$$R_1\text{--}SO_3\text{--}M$$

wherein R_1 is chosen from the group consisting of a straight or branched chain, saturated aliphatic hydrocarbon radical having from about 8 to about 24, preferably about 10 to about 16, carbon atoms; and M is a cation. Still other anionic synthetic surfactants include the class designated as succinamates, olefin sulfonates having about 12 to about 24 carbon atoms, and β-alkyloxy alkane sulfonates. Examples of these materials are sodium lauryl sulfate and ammonium lauryl sulfate.

Other anionic materials useful herein are soaps (i.e. alkali metal salts, e.g., sodium or potassium salts) of fatty acids, typically having from about 8 to about 24 carbon atoms, preferably from about 10 to about 20 carbon atoms. The fatty acids used in making the soaps can be obtained from natural sources such as, for instance, plant or animal-derived glycerides (e.g., palm oil, coconut oil, soybean oil, castor oil, tallow, lard, etc.) The fatty acids can also be synthetically prepared. Soaps are described in more detail in U.S. Patent No. 4,557,853, cited above.

Amphoteric and zwitterionic surfactants are also useful herein. Examples of amphoteric and zwitterionic surfactants which can be used in the compositions of the present invention are those which are broadly described as derivatives of aliphatic secondary and tertiary amines in which the aliphatic radical can be straight or branched chain and wherein one of the aliphatic substituents contains from about 8 to about 22 carbon atoms (preferably C_8 - C_{18}) and one contains an anionic water solubilizing group, e.g., carboxy, sulfonate, sulfate, phosphate, or phosphonate. Examples are alkyl imino acetates, and iminodialkanoates and aminoalkanoates of the formulas

$RN[CH_2)_mCO_2M]_2$ and $RNH(CH_2)_mCO_2M$ wherein m is from 1 to 4, R is a C_8-C_{22} alkyl or alkenyl, and M is H, alkali metal, alkaline earth metal ammonium, or alkanolammonium. Also included are imidazolinium and ammonium derivatives. Specific examples of suitable amphoteric surfactants include sodium 3-dodecyl-aminopropionate, sodium 3-dodecylaminopropane sulfonate, N-alkyltaurines such as the one prepared by reacting dodecylamine with sodium isethionate according to the teaching of U.S. Patent 2,658,072 which is incorporated herein by reference in its entirety; N-higher alkyl aspartic acids such as those produced according to the teaching of U.S. Patent 2,438,091 which is incorporated herein by reference in its entirety; and the products sold under the trade name "Miranol" and described in U.S. Patent 2,528,378, which is incorporated herein by reference in its entirety. Other examples of useful amphoterics include phosphates, such as coamidopropyl PG-dimonium chloride phosphate (commercially available as Monaquat PTC, from Mona Corp.).

Also useful herein as amphoteric or zwitterionic surfactants are the betaines. Examples of betaines include the higher alkyl betaines, such as coco dimethyl carboxymethyl betaine, lauryl dimethyl carboxymethyl betaine, lauryl dimethyl alphacarboxyethyl betaine, cetyl dimethyl carboxymethyl betaine, cetyl dimethyl betaine (available as Lonzaine 16SP from Lonza Corp.), lauryl bis-(2-hydroxyethyl) carboxymethyl betaine, stearyl bis-(2-hydroxypropyl) carboxymethyl betaine, oleyl dimethyl gamma-carboxypropyl betaine, lauryl bis-(2-hydroxypropyl)alpha-carboxyethyl betaine, coco dimethyl sulfopropyl betaine, stearyl dimethyl sulfopropyl betaine, lauryl dimethyl sulfoethyl betaine, lauryl bis-(2-hydroxyethyl) sulfopropyl betaine, and amidobetaines and amidosulfobetaines (wherein the $RCONH(CH_2)_3$ radical is attached to the nitrogen atom of the betaine), oleyl betaine (available as amphoteric Velvetex OLB-50 from Henkel), and cocamidopropyl betaine (available as Velvetex BK-35 and BA-35 from Henkel).

Other useful amphoteric and zwitterionic surfactants include the sultaines and hydroxysultaines such as cocamidopropyl hydroxysultaine (available as Mirataine CBS from Rhone-Poulenc), and the alkanoyl sarcosinates corresponding to the formula $RCON(CH_3)CH_2CH_2CO_2M$ wherein R is alkyl or alkenyl of about 10 to about 20 carbon atoms, and M is a water-soluble cation such as ammonium, sodium, potassium and trialkanolamine (e.g., triethanolamine), a preferred example of which is sodium lauroyl sarcosinate.

(iii) Water

The preferred oil-in-water emulsion comprises from about 25% to about 98%, preferably from about 65% to about 95%, more preferably from about 70% to about 90%

water by weight of the topical carrier.

The hydrophobic phase is dispersed in the continuous aqueous phase. The hydrophobic phase may contain water insoluble or partially soluble materials such as are known in the art, including but not limited to the silicones described herein in reference to silicone-in-water emulsions, and other oils and lipids such as described above in reference to emulsions.

The topical compositions of the subject invention, including but not limited to lotions and creams, may comprise a dermatologically acceptable emollient. Such compositions preferably contain from about 2% to about 50% of the emollient. As used herein, "emollient" refers to a material used for the prevention or relief of dryness, as well as for the protection of the skin. A wide variety of suitable emollients are known and may be used herein. Sagarin, Cosmetics, Science and Technology, 2nd Edition, Vol. 1, pp. 32-43 (1972), incorporated herein by reference, contains numerous examples of materials suitable as an emollient.

Lotions and creams according to the present invention generally comprise a solution carrier system and one or more emollients. Lotions typically comprise from about 1% to about 20%, preferably from about 5% to about 10%, of emollient; from about 50% to about 90%, preferably from about 60% to about 80%, water; and the Centella asiatica extract in the above described amounts. A cream typically comprises from about 5% to about 50%, preferably from about 10% to about 20%, of emollient; from about 45% to about 85%, preferably from about 50% to about 75%, water; and the Centella asiatica extract in the above described amounts.

Ointments of the present invention may comprise a simple carrier base of animal or vegetable oils or semi-solid hydrocarbons (oleaginous); absorption ointment bases which absorb water to form emulsions; or water soluble carriers, e.g., a water soluble solution carrier. Ointments may further comprise a thickening agent, such as described in Sagarin, Cosmetics, Science and Technology, 2nd Edition, Vol. 1, pp. 72-73 (1972), incorporated herein by reference, and/or an emollient. For example, an ointment may comprise from about 2% to about 10% of an emollient; from about 0.1% to about 2% of a thickening agent; and the Centella asiatica extract in the above described amount.

Compositions of this invention useful for cleansing ("cleansers") are formulated with a suitable carrier, e.g., as described above, and preferably contain, in addition to the Centella asiatica extract in the above described amounts, from about 1% to about 90%, more preferably from about 5% to about 10%, of a dermatologically acceptable surfactant. The surfactant is suitably selected from anionic, nonionic, zwitterionic, amphoteric and ampholytic surfactants, as well as mixtures of these surfactants. Such

surfactants are well known to those skilled in the detergency art. Nonlimiting examples of possible surfactants include isoceteth-20, sodium methyl cocoyl taurate, sodium methyl oleoyl taurate, and sodium lauryl sulfate. See U.S. Patent No. 4,800,197, to Kowcz et al., issued January 24, 1989, which is incorporated herein by reference in its entirety, for exemplary surfactants useful herein. Examples of a broad variety of additional surfactants useful herein are described in McCutcheon's Detergents and Emulsifiers, North American Edition (1986), published by Allured Publishing Corporation, which is incorporated herein by reference in its entirety. The cleansing compositions can optionally contain, at their art-established levels, other materials which are conventionally used in cleansing compositions.

The physical form of the cleansing compositions is not critical. The compositions can be, for example, formulated as toilet bars, liquids, shampoos, bath gels, hair conditioners, hair tonics, pastes, or mousses. Toilet bars are most preferred since this is the form of cleansing agent most commonly used to wash the skin. Rinse-off cleansing compositions, such as shampoos, require a delivery system adequate to deposit sufficient levels of actives on the skin and scalp. A preferred delivery system involves the use of insoluble complexes. For a more complete disclosure of such delivery sytems, see U.S. Patent 4,835,148, Barford et al., issued May 30, 1989, incorporated herein by reference in its entirety.

As used herein, the term "foundation" refers to a liquid, semi-liquid, semi-solid, or solid skin cosmetic which includes, but is not limited to, lotions, creams, gels, pastes, cakes, and the like. Typically the foundation is used over a large area of the skin, such as over the face, to provide a particular look. Foundations are typically used to provide an adherent base for color cosmetics such as rouge, blusher, powder and the like, and tend to hide skin imperfections and impart a smooth, even appearance to the skin. Foundations of the present invention include a dermatologically acceptable carrier for the Centella asiatica extract and may include conventional ingredients such as oils, colorants, pigments, emollients, fragrances, waxes, stabilizers, and the like. Exemplary carriers and such other ingredients which are suitable for use herein are described, for example, in copending patent application Serial No. 08/430,961, filed on April 28, 1995 in the names of Marcia L. Canter, Brain D. Barford, and Brian D. Hofrichter, incorporated herein by reference.

The compositions of the present invention are preferably formulated to have a pH of 10.5 or below. The pH values of these compositions preferably range from about 2 to about 10.5, more preferably from about 3 to about 8, even more preferably from about 4 to about 7, and also from about 4.5 to about 5.5.

Optional Components

The topical compositions of the present invention may comprise a wide variety of optional components, provided that such optional components are physically and chemically compatible with the essential components described herein, and do not unduly impair stability, efficacy or other use benefits associated with the compositions of the present invention. Any optional ingredients should be compatible with the Centella asiatica extract such that its activity does not decrease unacceptably, preferably not to any significant extent, over a useful period (preferably at least about two years under normal storage conditions). For example, strong oxidizing agents may be incompatible with the Centella asiatica such that such agents are preferably avoided. Optional components may be dispersed, dissolved or the like in the carrier of the present compositions.

Optional components include aesthetic agents and other active agents. For example, the compositions may include absorbents, abrasives, anticaking agents, antifoaming agents, antimicrobial agents, binders, biological additives, buffering agents, bulking agents, chemical additives, cosmetic biocides, denaturants, cosmetic astringents, drug astringents, external analgesics, film formers, humectants, opacifying agents, fragrances, pigments, colorings, essential oils, skin sensates, emollients, skin soothing agents, skin healing agents, pH adjusters, plasticizers, preservatives, preservative enhancers, propellants, reducing agents, additional skin-conditioning agents, skin penetration enhancing agents, skin protectants, solvents, suspending agents, emulsifiers, thickening agents, solubilizing agents, sunscreens, sunblocks, ultraviolet light absorbers or scattering agents, sunless tanning agents, antioxidants and/or radical scavengers, chelating agents, sequestrants, anti-acne agents, anti-inflammatory agents, anti-androgens, depilation agents, desquamation agents/exfoliants, organic hydroxy acids, vitamins and derivatives thereof, and other natural extracts. Such other materials are known in the art. For example, nonexclusive examples of such materials are described in Harry's Cosmeticology, 7th Ed., Harry & Wilkinson (Hill Publishers, London 1982); in Pharmaceutical Dosage Forms- Disperse Systems; Lieberman, Rieger & Banker, Vols. 1 (1988) & 2 (1989); Marcel Decker, Inc.; in The Chemistry and Manufacture of Cosmetics, 2nd. Ed., deNavarre (Van Nostrand 1962-1965); and in The Handbook of Cosmetic Science and Technology, 1st Ed.. Knowlton & Pearce (Elsevier 1993).

Specific examples of optional components include the following.

A. Anti-Inflammatory Agents

A safe and effective amount of an anti-inflammatory agent may be added to the compositions of the subject invention, preferably from about 0.1% to about 10%, more preferably from about 0.5% to about 5%, of the composition. The anti-inflammatory

agent enhances the skin appearance benefits of the present invention, e.g., such agents contribute to a more uniform and acceptable skin color. The exact amount of anti-inflammatory agent to be used in the compositions will depend on the particular anti-inflammatory agent utilized since such agents vary widely in potency.

Steroidal anti-inflammatory agents, including but not limited to, corticosteroids such as hydrocortisone, hydroxyltriamcinolone, alpha-methyl dexamethasone, dexamethasone-phosphate, beclomethasone dipropionates, clobetasol valerate, desonide, desoxymethasone, desoxycorticosterone acetate, dexamethasone, dichlorisone, diflorasone diacetate, diflucortolone valerate, fluadrenolone, fluclorolone acetonide, fludrocortisone, flumethasone pivalate, fluosinolone acetonide, fluocinonide, flucortine butylesters, fluocortolone, fluprednidene (fluprednylidene) acetate, flurandrenolone, halcinonide, hydrocortisone acetate, hydrocortisone butyrate, methylprednisolone, triamcinolone acetonide, cortisone, cortodoxone, flucetonide, fludrocortisone, difluorosone diacetate, fluradrenolone, fludrocortisone, diflurosone diacetate, fluradrenolone acetonide, medrysone, amcinafel, amcinafide, betamethasone and the balance of its esters, chloroprednisone, chlorprednisone acetate, clocortelone, clescinolone, dichlorisone, diflurprednate, flucloronide, flunisolide, fluoromethalone, fluperolone, fluprednisolone, hydrocortisone valerate, hydrocortisone cyclopentylpropionate, hydrocortamate, meprednisone, paramethasone, prednisolone, prednisone, beclomethasone dipropionate, triamcinolone, and mixtures thereof may be used. The preferred steroidal anti-inflammatory for use is hydrocortisone.

A second class of anti-inflammatory agents which is useful in the compositions includes the nonsteroidal anti-inflammatory agents. The variety of compounds encompassed by this group are well-known to those skilled in the art. For detailed disclosure of the chemical structure, synthesis, side effects, etc. of non-steroidal anti-inflammatory agents, reference may be had to standard texts, including Anti-inflammatory and Anti-Rheumatic Drugs, K.D. Rainsford, Vol. I-III, CRC Press, Boca Raton, (1985), and Anti-inflammatory Agents, Chemistry and Pharmacology, 1, R.A. Scherrer, et al., Academic Press, New York (1974), each incorporated herein by reference.

Specific non-steroidal anti-inflammatory agents useful in the composition invention include, but are not limited to:

1) the oxicams, such as piroxicam, isoxicam, tenoxicam, sudoxicam, and CP-14,304;

2) the salicylates, such as aspirin, disalcid, benorylate, trilisate, safapryn, solprin, diflunisal, and fendosal;

3) the acetic acid derivatives, such as diclofenac, fenclofenac, indomethacin, sulindac, tolmetin, isoxepac, furofenac, tiopinac, zidometacin, acematacin, fentiazac, zomepirac, clindanac, oxepinac, felbinac, and ketorolac;

4) the fenamates, such as mefenamic, meclofenamic, flufenamic, niflumic, and tolfenamic acids;

5) the propionic acid derivatives, such as ibuprofen, naproxen, benoxaprofen, flurbiprofen, ketoprofen, fenoprofen, fenbufen, indopropfen, pirprofen, carprofen, oxaprozin, pranoprofen, miroprofen, tioxaprofen, suprofen, alminoprofen, and tiaprofenic; and

6) the pyrazoles, such as phenylbutazone, oxyphenbutazone, feprazone, azapropazone, and trimethazone.

Mixtures of these non-steroidal anti-inflammatory agents may also be employed, as well as the dermatologically acceptable salts and esters of these agents. For example, etofenamate, a flufenamic acid derivative, is particularly useful for topical application. Of the nonsteroidal anti-inflammatory agents, ibuprofen, naproxen, flufenamic acid, etofenamate, aspirin, mefenamic acid, meclofenamic acid, piroxicam and felbinac are preferred; ibuprofen, naproxen, aspirin, etofenamate, and flufenamic acid are most preferred.

Finally, so-called "natural" anti-inflammatory agents are useful in methods of the subject invention. For example, candelilla wax, alpha bisabolol, aloe vera, Manjistha (extracted from plants in the genus Rubia, particularly Rubia Cordifolia), and Guggal (extracted from plants in the genus Commiphora, particularly Commiphora Mukul), kola extract, chamomile, and sea whip extract, may be used.

Additional anti-inflammatory agents useful herein include glycyrrhetinic acid and its derivatives, such as stearyl esters and ammonium salts.

B. Retinoids

A safe and effective amount of a retinoid may be added to the compositions of the subject invention, preferably from about 0.001% to about 0.5%, more preferably from about 0.01% to about 0.1% of the composition. As used herein, "retinoid" includes all natural and/or synthetic analogs of Vitamin A or retinol-like compounds which possess the biological activity of Vitamin A in the skin as well as the geometric isomers and stereoisomers of these compounds, such as all-trans retinoic acid and 13-cis-retinoic acid. The retinoid is preferably retinol, retinol esters (e.g., retinyl palmitate or retinyl acetate), retinal, or retinoic acid, more preferably retinol or retinyl palmitate.

The retinoids enhance the skin appearance benefits of the present invention. For example, the retinoids may help diminish fine lines, wrinkles, or other textural

discontinuities of the skin.

C. Antimicrobial Agents

As used herein, "antimicrobial agent" means a compound capable of destroying microbes, preventing the development of microbes or preventing the pathogenic action of microbes. Antimicrobial agents are useful, for example, in controlling acne. A safe and effective amount of an antimicrobial agent may be added to compositions of the subject invention, preferably from about 0.001% to about 10%, more preferably from about 0.01% to about 5%, also from about 0.05% to about 2% or from about 0.05% to about 1% of the compositions. Preferred antimicrobial agents useful in the subject invention are benzoyl peroxide, erythromycin, tetracycline, clindamycin, azelaic acid, and sulfur resorcinol.

D. Antiandrogens

As used herein, "anti-androgen" means a compound capable of correcting androgen-related disorders by interfering with the action of androgens at their target organs. The target organ for the subject invention is mammalian skin. Exemplary antiandrogens include pregnenalone (and its derivatives), hops extract, oxygenated alkyl substituted bicyclo alkanes (e.g., ethoxyhexyl-bicyclo octanones such as marketed by Chantal Pharmaceutical of Los Angeles, CA under the trade names ETHOCYN and CYOCTOL, and 2-(5-ethoxy hept-1-yl)bicylo[3.3.0]octanone), and oleanolic acid. Suitable antiandrogens are disclosed in U.S. Patent Nos. 4,689,345 and 4,855,322, both issued to Kasha et al. on August 25, 1987 and August 8, 1989, respectively, each incorporated herein by reference.

E. Sunscreens and Sunblocks

Exposure to ultraviolet light can result in excessive scaling and texture changes of the stratum corneum. Therefore, the compositions of the subject invention preferably contain a sunscreen or sunblock. Suitable sunscreens or sunblocks may be organic or inorganic.

A wide variety of conventional sunscreening agents are suitable for use herein. Sagarin, et al., at Chapter VIII, pages 189 et seq., of Cosmetics Science and Technology (1972), discloses numerous suitable agents, and is incorporated herein by reference. Specific suitable sunscreening agents include, for example: p-aminobenzoic acid, its salts and its derivatives (ethyl, isobutyl, glyceryl esters; p-dimethylaminobenzoic acid); anthranilates (i.e., o-amino-benzoates; methyl, menthyl, phenyl, benzyl, phenylethyl, linalyl, terpinyl, and cyclohexenyl esters); salicylates (amyl, phenyl, octyl, benzyl, menthyl, glyceryl, and di-pro-pyleneglycol esters); cinnamic acid derivatives (menthyl and benzyl esters, a-phenyl cinnamonitrile; butyl cinnamoyl pyruvate);

dihydroxycinnamic acid derivatives (umbelliferone, methylumbelliferone; methylaceto-umbelliferone); trihydroxy-cinnamic acid derivatives (esculetin, methylesculetin, daphnetin, and the glucosides, esculin and daphnin); hydrocarbons (diphenylbutadiene, stilbene); dibenzalacetone and benzalacetophenone; naphtholsulfonates (sodium salts of 2-naphthol-3,6-disulfonic and of 2-naphthol-6,8-disulfonic acids); di-hydroxynaphthoic acid and its salts; o- and p-hydroxybiphenyldisulfonates; coumarin derivatives (7-hydroxy, 7-methyl, 3-phenyl); diazoles (2-acetyl-3-bromoindazole, phenyl benzoxazole, methyl naphthoxazole, various aryl benzothiazoles); quinine salts (bisulfate, sulfate, chloride, oleate, and tannate); quinoline derivatives (8-hydroxyquinoline salts, 2-phenylquinoline); hydroxy- or methoxy-substituted benzophenones; uric and violuric acids; tannic acid and its derivatives (e.g., hexaethylether); (butyl carbotol) (6-propyl piperonyl) ether; hydroquinone; benzophenones (oxybenzene, sulisobenzone, dioxybenzone, benzoresorcinol, 2,2',4,4'-tetrahydroxybenzophenone, 2,2'-dihydroxy-4,4'-dimethoxybenzophenone, octabenzone; 4-isopropyldibenzoylmethane; butylmethoxydibenzoylmethane; etocrylene; [3-(4'-methylbenzylidene bornan-2-one) and 4-isopropyl-di-benzoylmethane.

Of these, 2-ethylhexyl-p-methoxycinnamate (commercially available as PARSOL MCX), 4,4'-t-butyl methoxydibenzoyl-methane (commercially available as PARSOL 1789), 2-hydroxy-4-methoxybenzophenone, octyldimethyl-p-aminobenzoic acid, digalloyltrioleate, 2,2-dihydroxy-4-methoxybenzophenone, ethyl-4-(bis(hydroxy-propyl))aminobenzoate, 2-ethylhexyl-2-cyano-3,3-diphenylacrylate, 2-ethylhexyl-salicylate, glyceryl-p-aminobenzoate, 3,3,5-tri-methylcyclohexylsalicylate, methylanthranilate, p-dimethyl-aminobenzoic acid or aminobenzoate, 2-ethylhexyl-p-dimethyl-amino-benzoate, 2-phenylbenzimidazole-5-sulfonic acid, 2-(p-dimethylaminophenyl)-5-sulfonicbenzoxazoic acid, octocrylene and mixtures of these compounds, are preferred.

More preferred organic sunscreens useful in the compositions useful in the subject invention are 2-ethylhexyl-p-methoxycinnamate, butylmethoxydibenzoyl-methane, 2-hydroxy-4-methoxybenzo-phenone, octyldimethyl-p-aminobenzoic acid, octocrylene and mixtures thereof.

Also particularly useful in the compositions are sunscreens such as those disclosed in U.S. Patent No. 4,937,370 issued to Sabatelli on June 26, 1990, and U.S. Patent No. 4,999,186 issued to Sabatelli & Spirnak on March 12, 1991, both of which are incorporated herein by reference. The sunscreening agents disclosed therein have, in a single molecule, two distinct chromophore moieties which exhibit different ultra-violet radiation absorption spectra. One of the chromophore moieties absorbs predominantly in

the UVB radiation range and the other absorbs strongly in the UVA radiation range.

Preferred members of this class of sunscreening agents are 4-N,N-(2-ethylhexyl)methyl-aminobenzoic acid ester of 2,4-dihydroxybenzophenone; N,N-di-(2-ethylhexyl)-4-aminobenzoic acid ester with 4-hydroxydibenzoylmethane; 4-N,N-(2-ethylhexyl)methyl-aminobenzoic acid ester with 4-hydroxydibenzoylmethane; 4-N,N-(2-ethylhexyl)methyl-aminobenzoic acid ester of 2-hydroxy-4-(2-hydroxyethoxy)benzophenone; 4-N,N-(2-ethylhexyl)-methylaminobenzoic acid ester of 4-(2-hydroxyethoxy)dibenzoylmethane; N,N-di-(2-ethylhexyl)-4-aminobenzoic acid ester of 2-hydroxy-4-(2-hydroxyethoxy)benzophenone; and N,N-di-(2-ethylhexyl)-4-aminobenzoic acid ester of 4-(2-hydroxyethoxy)dibenzoylmethane and mixtures thereof.

Suitable inorganic sunscreens or sunblocks include metal oxides, e.g., zinc oxide and titanium dioxide. For example, the use of a titanium dioxide in topical sunscreen compositions that is applicable to the present invention is described in copending application Serial No. 08/448,942, filed on May 24, 1995, in the names of Jiang Yue, Lisa R. Dew and Donald L. Bissett, incorporated herein by reference.

Especially preferred sunscreens or sunblocks include the metal oxides such as zinc oxide and titanium dioxide, butylmethoxydibenzoyl methane, 2-ethylhexyl-p-methoxycinnamate, phenylbenzimidazole sulfonic acid, and octocrylene.

A safe and effective amount of the sunscreen or sunblock is used, typically from about 1% to about 20%, more typically from about 2% to about 10%. Exact amounts will vary depending upon the sunscreen chosen and the desired Sun Protection Factor (SPF).

An agent may also be added to any of the compositions useful in the subject invention to improve the skin substantivity of those compositions, particularly to enhance their resistance to being washed off by water, or rubbed off. A preferred agent which will provide this benefit is a copolymer of ethylene and acrylic acid. Compositions comprising this copolymer are disclosed in U.S. Patent 4,663,157, Brock, issued May 5, 1987, which is incorporated herein by reference.

F. Anti-Oxidants/Radical Scavengers

Preferred compositions of the subject invention include an anti-oxidant/radical scavenger as an active in addition to the primary active agents. The anti-oxidant/radical scavenger is especially useful for providing protection against UV radiation which can cause increased scaling or texture changes in the stratum corneum and against other environmental agents which can cause skin damage.

A safe and effective amount of an anti-oxidant/radical scavenger may be added to the compositions of the subject invention, preferably from about 0.1% to about 10%, more preferably from about 1% to about 5%, of the composition.

Anti-oxidants/radical scavengers such as ascorbic acid (vitamin C) and its salts, ascorbyl esters of fatty acids, ascorbic acid derivatives (e.g., magnesium ascorbyl phosphate), tocopherol (vitamin E), tocopherol sorbate, other esters of tocopherol, butylated hydroxy benzoic acids and their salts, 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid (commercially available under the tradename Trolox^{R}), gallic acid and its alkyl esters, especially propyl gallate, uric acid and its salts and alkyl esters, sorbic acid and its salts, amines (e.g., N,N-diethylhydroxylamine, amino-guanidine), sulfhydryl compounds (e.g., glutathione), dihydroxy fumaric acid and its salts, lycine pidolate, arginine pilolate, nordihydroguaiaretic acid, bioflavonoids, lysine, methionine, proline, superoxide dismutase, silymarin, tea extracts, grape skin/seed extracts, melanin, and rosemary extracts may be used. Preferred anti-oxidants/radical scavengers are selected from tocopherol sorbate and other esters of tocopherol, more preferably tocopherol sorbate. For example, the use of tocopherol sorbate in topical compositions and applicable to the present invention is described in U.S. Patent No. 4,847,071, issued on July 11, 1989 to Donald L. Bissett, Rodney D. Bush and Ranjit Chatterjee, incorporated herein by reference.

G. Chelators

As used herein, "chelating agent" means an active agent capable of removing a metal ion from a system by forming a complex so that the metal ion cannot readily participate in or catalyze chemical reactions. The inclusion of a chelating agent is especially useful for providing protection against UV radiation which can contribute to excessive scaling or skin texture changes and against other environmental agents which can cause skin damage.

A safe and effective amount of a chelating agent may be added to the compositions of the subject invention, preferably from about 0.1% to about 10%, more preferably from about 1% to about 5%, of the composition. Exemplary chelators that are useful herein are disclosed in U.S. Patent No. 5,487,884, issued 1/30/96 to Bissett et al.; International Publication No. 91/16035, Bush et al., published 10/31/95; and International Publication No. 91/16034, Bush et al., published 10/31/95; all incorporated herein by reference. Preferred chelators useful in compositions of the subject invention are furildioxime and derivatives thereof.

H. Organic Hydroxy Acids

Compositions of the present invention preferably comprise an organic hydroxy acid. Suitable hydroxy acids include C1 - C18 hydroxy acids, preferably C8 or below. The hydroxy acids can be substituted or unsubstituted, straight chain, branched chain or cyclic (preferably straight chain), and saturated or unsaturated (mono- or poly-

unsaturated) (preferably saturated). Non-limiting examples of hydroxy acids include salicylic acid, glycolic acid, lactic acid, 5 octanoylsalicylic acid, hydroxyoctanoic acid, hydroxycaprylic acid, and lanolin fatty acids. Preferred concentrations of the organic hydroxy acid range from about 0.1% to about 10%, more preferably from about 0.2% to about 5%, also preferably from about 0.5% to about 2%. Salicylic acid is preferred. The organic hydroxy acids enhance the skin appearance benefits of the present invention. For example, the organic hydroxy acids tend to improve the texture of the skin.

I. Desquamation Agents/Exfoliants

A safe and effective amount of a desquamation agent may be added to the compositions of the subject invention, preferably from about 0.1% to about 10%, more preferably from about 0.2% to about 5%, also preferably from about 0.5% to about 4% of the composition. Desquamation agents enhance the skin appearance benefits of the present invention. For example, the desquamation agents tend to improve the texture of the skin (e.g., smoothness). A variety of desquamation agents are known in the art and are suitable for use herein, including but not limited to the organic hydroxy agents described above. One desquamation system that is suitable for use herein comprises certain sulfhydryl compounds and certain zwitterionic surfactants and is described in copending application Serial No. 08/480,632, filed on June 7, 1995 in the name of Donald L. Bissett, corresponding to PCT Application No. U.S. 95/08136, filed 6/29/95, each incorporated herein by reference. Another desquamation system that is suitable for use herein comprises salicylic acid and certain zwitterionic surfactants and is described in copending patent application Serial No. 08/554,944, filed on November 13, 1995 as a continuation of 08/209,401, filed on March 9, 1994 in the name of Bissett, corresponding to PCT Application No. 94/12745, filed 11/4/94, published 5/18/95, each incorporated herein by reference. Zwitterionic surfactants such as described in these applications are also useful as desquamatory agents herein, with cetyl betaine being particularly preferred.

J. Depilation Agents

The compositions of the present invention may include a safe and effective amount of a depilation agent. When used, the composition preferably contains from about 0.1% to about 10%, more preferably from about 0.2% to about 5%, also preferably from about 0.5% to about 2% of depilation agent. A depilation agent preferred for use herein comprises a sulfhydryl compound, e.g., N-acetyl-L-cysteine. The use of such depilation agents is described in more detail in copending application Serial No. 08/479,878, filed on June 7, 1995, in the name of Greg G. Hillebrand and Vladimir Gartstein, corresponding to PCT Application No. U.S. 95/07311, filed 6/8/95, each incorporated herein by reference.

K. Skin Lightening Agents

The compositions of the present invention may comprise a skin lightening agent. When used, the compositions preferably comprise from about 0.1% to about 10%, more preferably from about 0.2% to about 5%, also preferably from about 0.5% to about 2%, of a skin lightening agent. Suitable skin lightening agents include those known in the art, including kojic acid, arbutin, ascorbic acid and derivatives thereof, e.g., magnesium ascorbyl phosphate. Skin lightening agents suitable for use herein also include those described in copending patent application Serial No. 08/479,935, filed on June 7, 1995 in the name of Hillebrand, corresponding to PCT Application No. U.S. 95/07432, filed 6/12/95; and copending patent application Serial No.08/390,152, filed on February 24, 1995 in the names of Kalla L. Kvalnes, Mitchell A. DeLong, Barton J. Bradbury, Curtis B. Motley, and John D. Carter, corresponding to PCT Application No. U.S. 95/02809, filed 3/1/95, published 9/8/95; all incorporated herein by reference. Magnesium ascorbyl phosphate is preferred.

L. Zinc Salts

The compositions of the present invention may further comprise a zinc salt. Zinc salts are especially preferred where the composition contains a sulfhydryl compound, e.g., N-acetyl-L-cysteine. Without intending to be limited or bound by theory, it is believed that the zinc salt acts as a chelating agent capable of complexing with the sulfhydryl compound prior to topical application, stabilizes the sulfhydryl compound and/or controls odor associated with the sulfhydryl compound. Concentrations of the zinc salt can range from about 0.001% to about 10%, more preferably from about 0.01% to about 5%, most preferably from about 0.1% to about 0.5% by weight of the composition.

Preferred zinc salts include zinc acetate, zinc acetate hydrates such as zinc acetate-2-water, zinc aluminum oxide complexes such as gahnite, zinc diamine, zinc antimonide, zinc bromate hydrates such as zinc bromate-6-water, zinc bromide, zinc carbonates such as zincspar and smithsonite, zinc chlorate hydrates such as zinc chlorate-4-water, zinc chloride, zinc diamine dichloride, zinc citrate, zinc chromate, zinc dichromate, zinc diphosphate, zinc hexacyanofluoride ferrate (II), zinc fluoride, zinc fluoride hydrates such as zinc fluoride-4-water, zinc formate, zinc formate hydrates such as zinc formate-2-water, zinc hydroxide, zinc iodate, zinc iodate hydrates such as zinc iodate-2-water, zinc iodide, zinc iron oxide complexes, zinc nitrate hydrates such as zinc nitrate-6-water, zinc nitride, zinc oxalate hydrates such as zinc oxalate-2-water, zinc oxides such as zincite, zinc perchlorate hydrates such as zinc perchlorate-6-water, zinc permanganate hydrates such as zinc permanganate-6-water, zinc peroxide, zinc *p*-phenolsulfonate hydrates such as zinc *p*-phenosulfonate-8-water, zinc phosphate, zinc phosphate hydrates such as zinc

phosphate-4-water, zinc phosphide, zinc propionate, zinc selenate hydrates such as zinc selenate-5-water, zinc selenide, zinc silicates such as zinc silicate (2) and zinc silicate (4), zinc silicon oxide water complexes such as hemimorphite, zinc hexafluorosilicate hydrates such as zinc hexafluorosilicate-6-water, zinc stearate, zinc sulfate, zinc sulfate hydrates such as zinc sulfate-7-water, zinc sulfide, zinc sulfite hydrates such as zinc sulfite-2-water, zinc telluride, zinc thiocyanate, zinc (II) salts of N-acetyl L-cysteine, and mixtures thereof.

Especially preferred zinc salts include zinc citrate, zinc oxide, zinc chloride, zinc acetate, zinc stearate, zinc sulfate, and mixtures thereof. Zinc citrate is especially preferred.

M. Humectants, Moisturizers, and Skin Conditioners

The compositions of the present invention may further comprise a humectant, moisturizing agent or skin conditioning agent. A variety of these materials can be employed and each can be present at a level of from about 0.1% to about 20%, more preferably from about 1% to about 10%, and most preferably from about 2% to about 5%. These materials include guanidine; glycolic acid and glycolate salts (e.g. ammonium and quaternary alkyl ammonium); lactic acid and lactate salts (e.g. ammonium and quaternary alkyl ammonium); aloe vera in any of its variety of forms (e.g., aloe vera gel); polyhydroxy alcohols such as sorbitol, glycerol, hexanetriol, propylene glycol, butylene glycol, hexylene glycol and the like; polyethylene glycols; sugars and starches; sugar and starch derivatives (e.g., alkoxylated glucose); hyaluronic acid; lactamide monoethanolamine; acetamide monoethanolamine; and mixtures thereof.

Also useful herein are the propoxylated glycerols described in U.S. Patent No. 4,976,953, which is description is incorporated herein by reference.

Also useful are various C1-C30 monoesters and polyesters of sugars and related materials. These esters are derived from a sugar or polyol moiety and one or more carboxylic acid moieties. Depending on the constituent acid and sugar, these esters can be in either liquid or solid form at room temperature. Examples of liquid esters include: glucose tetraoleate, the glucose tetraesters of soybean oil fatty acids (unsaturated), the mannose tetraesters of mixed soybean oil fatty acids, the galactose tetraesters of oleic acid, the arabinose tetraesters of linoleic acid, xylose tetralinoleate, galactose pentaoleate, sorbitol tetraoleate, the sorbitol hexaesters of unsaturated soybean oil fatty acids, xylitol pentaoleate, sucrose tetraoleate, sucrose pentaoletate, sucrose hexaoleate, sucrose hepatoleate, sucrose octaoleate, and mixtures thereof. Examples of solid esters include: sorbitol hexaester in which the carboxylic acid ester moieties are palmitoleate and arachidate in a 1:2 molar ratio; the octaester of raffinose in which the carboxylic acid

ester moieties are linoleate and behenate in a 1:3 molar ratio; the heptaester of maltose wherein the esterifying carboxylic acid moieties are sunflower seed oil fatty acids and lignocerate in a 3:4 molar ratio; the octaester of sucrose wherein the esterifying carboxylic acid moieties are oleate and behenate in a 2:6 molar ratio; and the octaester of sucrose wherein the esterifying carboxylic acid moieties are laurate, linoleate and behenate in a 1:3:4 molar ratio. A preferred solid material is sucrose polyester in which the degree of esterification is 7-8, and in which the fatty acid moieties are C18 mono- and/or di-unsaturated and behenic, in a molar ratio of unsaturates:behenic of 1:7 to 3:5. A particularly preferred solid sugar polyester is the octaester of sucrose in which there are about 7 behenic fatty acid moieties and about 1 oleic acid moiety in the molecule. The ester materials are further described in, U.S. Patent No. 2,831,854, U.S. Patent No. 4,005,196, to Jandacek, issued January 25, 1977; U.S. Patent No. 4,005,195, to Jandacek, issued January 25, 1977, U.S. Patent No. 5,306,516, to Letton et al., issued April 26, 1994; U.S. Patent No. 5,306,515, to Letton et al., issued April 26, 1994; U.S. Patent No. 5,305,514, to Letton et al., issued April 26, 1994; U.S. Patent No. 4,797,300, to Jandacek et al., issued January 10, 1989; U.S. Patent No. 3,963,699, to Rizzi et al, issued June 15, 1976; U.S. Patent No. 4,518,772, to Volpenhein, issued May 21, 1985; and U.S. Patent No. 4,517,360, to Volpenhein, issued May 21, 1985; all of which are incorporated by reference herein in their entirety.

N. Other Optional Components

The compositions of the present invention may also include other natural extracts, including those known in the topical personal care art. Such extracts enhance the skin appearance benefits of the present invention, and are preferably used in a safe and effective amount, more preferably an amount of from 0.1% to about 20%, even more preferably 0.5% to about 10%, also from 1% to about 5%. Such extracts include plant and fungal extracts such as extracts of yeast and rice bran.

Compounds which are known to stimulate the production of collagen can also be used in the present invention. Such compounds include Factor X (kinetin), Factor Z (zeatin), n-methyl taurine, dipalmitoyl hydroxyproline, palmitoyl hydroxy wheat protein, biopeptide CL (palmitoyl glycyl-histidyl-lysine), ASC III (Amplifier of Synthesis of Collagen III, E. Merck, Germany), beta glucan and niacinamide. Such compounds tend to improve the attenuation of skin texture discontinuities due to skin aging.

The compositions hereof can also include natural ceramides or the like, for example, ceramide 1 - 6.

The compositions can also contain an oil absorbent such as are known in the art, e.g. clays (e.g. bentonite) and polymeric absorbents (e.g., MICROSPONGES 5647 and

POLYTRAP, both commercially available from Advanced Polymer Systems, Inc. of Redwood City, California, USA.. MICROSPONGES 5647 is a polymer mixture derived from styrene, methyl methacrylate, and hydrogel acrylate/methacrylate.

Other examples of additional components useful herein include the following: water-soluble vitamins and derivatives thereof [e.g., vitamin C]; polyethyleneglycols and polypropyleneglycols; polymers for aiding the film-forming properties and substantivity of the composition (such as a copolymer of eicosene and vinyl pyrrolidone, an example of which is available from GAF Chemical Corporation as Ganex® V-220). Also useful are crosslinked and noncrosslinked nonionic and cationic polyacrylamides [e.g., Salcare SC92 which has the CTFA designation polyquaternium 32 (and) mineral oil, and Salcare SC 95 which has the CTFA designation polyquaternium 37 (and) mineral oil (and) PPG-1 trideceth-6, and the nonionic Seppi-Gel polyacrylamides available from Seppic Corp.]. Also useful are crosslinked and uncrosslinked carboxylic acid polymers and copolymers such as those containing one or more monomers derived from acrylic acid, substituted acrylic acids, and salts and esters of these acrylic acids and the substituted acrylic acids, wherein the crosslinking agent contains two or more carbon-carbon double bonds and is derived from a polyhydric alcohol (examples useful herein include the carbomers, which are homopolymers of acrylic acid crosslinked with allyl ethers of sucrose or pentaerytritol and which are available as the Carbopol® 900 series from B.F. Goodrich, and copolymers of C_{10-30} alkyl acrylates with one or more monomers of acrylic acid, methacrylic acid, or one of their short chain (i.e. C_{1-4} alcohol) esters, wherein the crosslinking agent is an allyl ether of sucrose or pentaerytritol, these copolymers being known as acrylates/C10-30 alkyl acrylate crosspolymers and are commercially available as Carbopol® 1342, Pemulen TR-1, and Pemulen TR-2, from B.F. Goodrich). These carboxylic acid polymers and copolymers are more fully described in U.S. Patent No. 5,087,445, to Haffey et al., issued February 11, 1992; U.S. Patent No. 4,509,949, to Huang et al., issued April 5, 1985; U.S. Patent No. 2,798,053, to Brown, issued July 2, 1957; which are incorporated by reference herein. See also, CTFA International Cosmetic Ingredient Dictionary, fourth edition, 1991, pp. 12 and 80; which is also incorporated herein by reference.

Also useful herein are aesthetic components such as fragrances, pigments, colorings, essential oils, skin sensates, astringents, skin soothing agents, skin healing agents and the like, nonlimiting examples of these aesthetic components include clove oil, menthol, camphor, eucalyptus oil, eugenol, menthyl lactate, witch hazel distillate, bisabolol, dipotassium glycyrrhizinate and the like.

In particularly preferred embodiments, the composition further comprises a

compound selected from the group consisting of retinoids, hydroxy acids, desquamatory agents, sunscreens, anti-oxidants, and combinations thereof.

Preparation of Compositions

The compositions of the present invention are generally prepared by conventional methods such as are known in the art of making topical compositions. Such methods typically involve mixing of the ingredients in one or more steps to a relatively uniform state, with or without heating, cooling, application of vacuum, and the like.

Methods for Regulating the Tactile and/or Visible Perception of Skin

The compositions of the present invention are useful for regulating skin condition, especially the tactile and/or visible perception of mammalian skin condition, especially human skin condition, more especially facial skin condition. The compositions are especially useful for ameliorating the tactile and/or visible perception of skin texture discontinuities, including fine lines, wrinkles and other skin texture discontinuities associated with aged skin. The compositions are also especially useful for prophylactically treating loss of skin elasticity, including elasticity loss associated with aging skin, such that signs of loss of elasticity, e.g., skin sagging, loss of firmness, loss of tightness and loss of recoil from deformation, are delayed, minimized, or prevented.

The methods of regulating the tactile and/or visible perception of skin condition involves topically applying to the skin a safe and effective amount of the compositions of the present invention. The amount of the composition which is applied, the frequency of application and the period of use will vary widely depending upon the level of Centella asiatica and/or other components of a given composition and the level of regulation desired, e.g., in light of the level of skin aging present in the subject and the rate of further skin aging.

In a preferred embodiment, the composition is chronically applied to the skin. By "chronic topical application" is meant continued topical application of the composition over an extended period during the subject's lifetime, preferably for a period of at least about one week, more preferably for a period of at least about one month, even more preferably for at least about three months, even more preferably for at least about six months, and more preferably still for at least about one year. While benefits are obtainable after various maximum periods of use (e.g., five, ten or twenty years), it is preferred that chronic application continue throughout the subject's lifetime. Typically applications would be on the order of about once per day over such extended periods, however application rates can vary, e.g., from about once per week up to about three times per day or more.

A wide range of quantities of the compositions of the present invention can be

employed to provide a skin appearance benefit. Quantities of the present compositions which are typically applied per application are, in mg composition/cm^2 skin, from about 0.1 mg/cm^2 to about 10 mg/cm^2. A particularly useful application amount is about 2 mg/cm^2. Such composition application rates correspond to Centella asiatica extract application rate of, for a composition containing 5% Centella asiatica extract, from about 0.005 mg/cm^2 to about 0.5 mg/cm^2, and 0.1 mg/cm^2, respectively.

The method of regulating tactile and/or visible perception of skin condition is preferably practiced by applying a composition in the form of a skin lotion, cream, cosmetic, or the like which is intended to be left on the skin for some esthetic, prophylactic, therapeutic or other benefit. After applying the composition to the skin, it is preferably left on the skin for a period of at least about 15 minutes, more preferably at least about 30 minutes, even more preferably at least about 1 hour, most preferably for at least several hours, e.g., up to about 12 hours.

EXAMPLE

The following example further describes and demonstrates embodiments within the scope of the present invention. The example is given solely for the purpose of illustration and is not to be construed as a limitation on the present invention, as many variations thereof are possible without departing from the spirit and scope of the invention.

A skin cream is prepared by conventional methods from the following components.

	Component	Weight %
Part A:	Water	63.7
	EDTA disodium	0.15
	Glycerol	5
Part B:	Cetyl hydroxyethylcellulose (Polysurf 67)	0.15
	Methyl p-hydroxybenzoate (Methylparaben)	0.25
Part C:	Centella asiatica (ETCA)	5
	Propylene glycol	10
Part D:	Cetyl alcohol	0.5
	Stearyl alcohol	0.5
	Behenyl alcohol	0.5
	Cetyl Ricinoleate	3
	Polyoxyethylene 2 stearyl ether (BRIJ 72)	1.05
	Distearyl dimethyl ammonium chloride (Varisoft TA100)	0.25
	Propyl p-hydroxybenzoate (Propylparaben)	0.1

	Myristyl myristate	1.5
	Caprylic/Capric Triglycerides (Myritol 318)	1.5
	Mineral oil, heavy	2
	fatty acid ester of sugar*	1
	PEG-5 Glyceryl stearate (Arlatone 983)	1.05
Part E:	Dimethicone (Dow Corning Q2-1068)	2
Part F:	Benzyl alcohol	0.5
Part G	Fragrance	0.3

* A C1-C30 monoester or polyester of sugars and one or more carboxylic acid moieties as described herein, preferably a sucrose polyester in which the degree of esterification is 7-8, and in which the fatty acid moieties are C18 mono- and/or di-unsaturated and behenic, in a molar ratio of unsaturates:behenic of 1:7 to 3:5, more preferably the octaester of sucrose in which there are about 7 behenic fatty acid moieties and about 1 oleic acid moiety in the molecule, e.g., sucrose ester of cottonseed oil fatty acids.

Blend the A phase components with a suitable mixer (e.g., Tekmar model RW20DZM), heating while stirring to a temperature of 70-80°C. Blend the B phase components into the A phase with a suitable mixer and heat at 70° C with mixing to melt the components. Separately, blend the C phase components and mill to obtain an acceptably smooth mixture (e.g., using a Tekmar T50 Mill).

Add the C phase mixture to the A/B phase mixture and mix until uniform.

Separately, blend the D phase components by stirring and heating to 70° C until dissolved, then add this to the combination of A-C materials.

Blend the E phase component into the combination of the A-D materials. Add part F to the combination of A-E and mix until uniform. Add part G to the combination of A-F and mix until uniform. Adjust the pH as necessary to 7.0, e.g., using NaOH or another suitable pH adjusting agent such as are known in the art.

Apply the composition to a subject's wrinkled, aged, or photodamaged facial skin at the rate of 2 mg composition/cm^2 skin once or twice daily for a period of at least 3-6 months to improve skin surface texture, including diminishing fine lines and wrinkles.

While particular embodiments of the subject invention have been described, it will be obvious to those skilled in the art that various changes and modifications to the subject invention can be made without departing from the spirit and scope of the invention. It is intended to cover, in the appended claims, all such modifications that are within the scope of the subject invention.

What is claimed is:

1. A method of ameliorating textural discontinuities in mammalian skin associated with skin aging, characterized in that the method comprises the step of topically applying a composition containing a safe and effective amount, preferably in the range of from 0.1% to 10%, of an active for such amelioration to the skin of a mammal in need of such amelioration, said active consisting essentially of Centella asiatica extract.

2. The method of Claim 1, wherein said active consists of Centella asiatica extract.

3. The method of Claim 1 or 2 wherein said Centella asiatica extract is substantially pure.

4. The method of any of the preceding Claims wherein said Centella asiatica extract contains asiatic acid and one or more of madecassic acid, asiaticoside and madecassoside, preferably asiatic acid, madecassic acid, and optionally asiaticoside and/or madecassoside.

5. The method of any of the preceding Claims wherein said amelioration includes ameliorating lines and/or wrinkles.

6. A method of prophylactically treating loss of skin elasticity in mammalian skin or tactile and/or visible signs thereof, characterized in that the method comprises the step of topically applying a composition containing a safe and effective amount, preferably in the range of from 0.1% to 10%, of an active for such treatment to the skin of a mammal, said active consisting essentially of substantially pure asiatic acid.

7. The method of Claim 6 wherein said active consists of substantially pure asiatic acid.

8. A method of prophylactically treating loss of skin elasticity in mammalian skin or tactile and/or visible signs thereof, characterized in that the method comprises the step of topically applying a composition containing a safe and effective amount, preferably in the range of from 0.1% to 10%, of an active for such treatment to the skin of a mammal, said active consisting essentially of Centella asiatica extract.

9. The method of any of the preceding Claims, comprising applying from 0.1 mg to 10 mg of said composition per one cm^2 skin once or twice daily.

INTERNATIONAL SEARCH REPORT

Internation pplication No
PCT/US 97/06690

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61K7/48

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	F. BONTE ET AL : "Influence of asiatic acid, madecassic acid, and asiaticoside on human collagen I synthesis" PLANTA MEDICA, vol. 60, no. 2, 1994, pages 133-135, XP002041892 see page 133 --- -/--	1,6

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

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Date of the actual completion of the international search	Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

International application No
PCT/US 97/06690

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CHEMICAL ABSTRACTS, vol. 109, no. 13, 26 September 1988 Columbus, Ohio, US; abstract no. 104757n, R. TENNI ET AL: "Effect of the triterpenoid fraction of Centella asiatica on macromolecures of the connective matrix in human skin fibroblast cultures" page 75; XP002041840 see abstract & ITALIAL JOURNAL OF BIOCHEMISTRY, vol. 37, no. 2, 1988, pages 69-77, ---	1,6
X	FR 1 433 383 A (LABORATOIRES LAROCHE NAVARRON) 13 June 1966 cited in the application see column 1; claim 1 ---	1,6
X	FR 2 594 690 A (J.-N. THOREL) 28 August 1987 cited in the application see claim 1 ---	1,6
P,A	EP 0 717 983 A (UNILEVER) 26 June 1996 see page 1; claims 1,9 -----	1,6

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US 97/06690

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EP 717983 A	26-06-96	US 5529769 A	25-06-96
		CA 2164050 A	21-06-96
		JP 8208424 A	13-08-96